

A black and white photograph of an early computer room. The room is filled with large, dark-colored metal cabinets or racks, likely housing computer components. Several people are visible, interacting with the equipment. In the foreground, a man is seated at a desk, looking at a device. In the background, other individuals are standing near the racks. The room has a high ceiling with exposed pipes and a single light bulb hanging from the ceiling. The overall atmosphere is one of a busy, early 20th-century technological environment.

Introduction to Information Technology

Lecture overview

1977-1980: reminder, first home computers

- **Commodore PET, Apple II, Radio Shack**
- **Apple**
- **Microsoft ja BASIC**
- **Games**

1981-1982: Home computers in offices

- **IBM PC**
- **Office software**
- **Workstations: Sun and Apollo**

1983-1989: Graphical User Interface (GUI), memory over 64 KB

- **Apple Lisa**
- **Apple Macintosh**
- **IBM clones**
- **MS Word, Windows planned**
- **Unix: System V, X-Windows, Gnu project**

1977-1980 : Home computers

- Apple, Commodore, Radio Shack
- Microsoft, more microprocessors, VisiCalc, Sinclair

1977

- **The Commodore PET (Personal Electronic Transactor) -- the first of several personal computers released in 1977 -- came fully assembled and was straightforward to operate.**



1977

- The Apple II became an instant success when released in 1977 with its printed circuit motherboard, switching power supply, keyboard, case assembly, manual, game paddles, A/C powercord, and cassette tape with the computer game "Breakout."



1977

- In the first month after its release, Tandy Radio Shack's first desktop computer -- the TRS-80 -- sold 10,000 units, well more than the company's projected sales of 3,000 units for one year.



1977

- The Apple Computer Company is incorporated.
- Apple employees move into an office on Stevens Creek Boulevard in Cupertino, California.
- A working model of the first Radio Shack computer is demonstrated to company president, Charles Tandy.
- Commodore first shows a prototype PET computer at the Winter Consumer Electronics Show.
- Apple Computer moves from Jobs' garage to an office in Cupertino.
- Bill Gates and Paul Allen sign a partnership agreement to officially create the Microsoft company.

1978

- **The VAX 11/780 from Digital Equipment Corp. featured the ability to address up to 4.3 gigabytes of virtual memory, providing hundreds of times the capacity of most minicomputers. NB! DEC has now two product lines for minicomp:**
 - **PDP**
 - **VAX**



- **The 5 1/4-inch floppy disk became the standard medium for personal computer software after Apple Computer and Tandy Radio Shack introduced disk drives for this format.**

1978

January

- Apple Computer demonstrates its first working prototype Apple II disk drive **at the Consumer Electronics Show, in Las Vegas.**

May

- **Intel begins production of the 8086 microprocessor. It is created by two engineers in just three weeks. Work on the processor began when it was realized that the i432 project was in trouble.**

June

- Intel introduces the 4.77-MHz 8086 microprocessor. **It uses 16-bit registers, a 16-bit data bus, and 29,000 transistors, using 3-micron technology. Price is US\$360. It can access 1 MB of memory. Speed is 0.33 MIPS. Later speeds included 8-MHz (0.66 MIPS) and 10-MHz.**
- **Microsoft ships Microsoft COBOL.**
- **Apple Computer introduces the Disk II, a 5.25 inch floppy disk drive linked to the Apple II by cable. Price: US\$495, including controller card.**
- Pertec ceases production of the Altair.

1979

- **Harvard MBA candidate Daniel Bricklin and programmer Robert Frankston developed VisiCalc, the program that made a business machine of the personal computer, for the Apple II.**



1979

- **In development since 1967, the Stanford Cart successfully crossed a chair-filled room without human intervention in 1979.**

January

- Xerox president replies to John Ellenby's proposal to market the Alto, turning down his proposal.
- **Microsoft moves its offices from Albuquerque, New Mexico to Bellevue, Washington.**
- **Taito first shows the Space Invaders game, in Japan.**

May

- Software Arts demonstrates VisiCalc at the 4th West Coast Computer Faire. Dan Bricklin and Bob Frankston wrote it during 1978-79, under the company name Software Arts, under contract to Personal Software.

1979

June

- **Apple Computer introduces the Apple II Plus, with 48KB memory, for US\$1195.**
- **Apple Computer introduces its first printer, the Apple Silentype, for US\$600. It is a Trendcom Model 200, released under the Apple name.**
- **Intel introduces the 4.77-MHz 8088 microprocessor. It was created as a stepping stone to the 8086, as it operates on 16 bits internally, but supports an 8-bit data bus, to use existing 8-bit device-controlling chips. It contains 29,000 transistors, using 3-micron technology, and can address 1MB of memory. Speed is 0.33 MIPS. A later version operates at 8-MHz, for a speed of 0.75 MIPS.**
- **Bob Metcalfe founds 3Com Corporation.**
- **Texas Instruments introduces the TI-99/4 personal computer, for an initial price of US\$1500. It uses the TI 9940 16-bit microprocessor.**
- **MicroPro releases the WordStar word processor, written by Rob Barnaby. It is made available for Intel 8080A Zilog Z-80 based CP/M-80 systems. written by Seymour Rubenstein**
- **Microsoft announces Microsoft BASIC 8086 at the National Computer Conference.**

1979

July

- **CompuServe begins a service to computer hobbyists called MicroNET, offering bulletin boards, databases, and games.**
- **Clive Sinclair creates Sinclair Research.**

August

- **Microsoft releases its Assembler language for 8080/Z80 microprocessors.**
- **Wayne Ratliff develops the Vulcan database program (Ashton- Tate later markets it as dBase II).**

September

- **Motorola's 68000 16-bit microprocessor appears. It uses 68,000 transistors, giving it its name.**

October

- **2.5 years after the introduction of the Apple II, 50,000 units have been sold.**
- **Personal Software releases VisiCalc for the Apple II, for US\$100.**

1979

- **Atari begins shipping the Atari 400 and Atari 800 personal computers. The 400 comes with 8KB, selling for US\$550. The 800 sells for US\$1000.**
- **Radio Shack begins shipping the TRS-80 Model II to users.**

November

- **Xerox Office Products Division president, Don Massaro, decides to champion the Star office system (based on the Alto).**

December

- **A group of Apple Computer engineers and executives is given a demo of Xerox Palo Alto Research Center's Alto computer system, in exchange for Xerox buying 100,000 Apple Computer shares for US\$1 million.**
- **Atari develops the Asteroids computer game.**
- **Microsoft completes work on BASIC for the Intel 8086 processor.**
- **The first Comdex show is held, in Las Vegas. Approximately 150 companies show products to some 4,000 visitors.**

1979

- **Microsoft begins developing an 8086 version of FORTRAN. [346.72]**
- **Apple Computer's Trip Hawkins negotiates a deal with Dan Fylstra of Personal Software to buy his company and VisiCalc for US\$1 million in Apple stock. Apple's president refuses to approve the deal.**
- **Ross Perot asks Bill Gates about buying Microsoft. Gates recalls asking US\$6-15 million. Perot recalls Gates asking US\$40-60 million.**
- **Alan Shugart founds Seagate Technologies (hard disk maker), in Scotts Valley,**
- **Apple Computer begins work on "Sara", the code name for what will be the Apple III.**
- **Apple Computer releases the word processing program AppleWriter 1.0.**
- **Schlumberger Ltd. sells Heath Company to Zenith Radio Corp. for US\$64.5 million.**
- **Automated Simulations releases Temple of Apshai for microcomputers.**
- **Niklaus Wirth invents the Modula-1 programming language.**
- **NEC releases its NEC PC 8001 microcomputer in Japan, the first for that country.**

1979

- **Xerox shows its Alto personal computer in TV commercials.**
- **After airing a TV commercial for the Alto several times, Xerox decides not to market the Alto.**

79-80: USENET : early “web” : text(-based) news

- **USENET is a huge amount of newsgroups. Text moves from machine to machine.**
- **USENET: Unix Users Network founded late 1979.**
- **Info transfer initially: through UUCP (Unix to Unix communications protocol, mostly with modem help (dialing-in).**
- **1979: released V7 Unix with UUCP. Two Duke University grad students in North Carolina, Tom Truscott and Jim Ellis, thought of hooking computers together to exchange information with the Unix community. Steve Bellovin, a grad student at the University of North Carolina, put together the first version of the news software using shell scripts and installed it on the first two sites: "unc" and "duke." At the beginning of 1980 the network consisted of those two sites and "phs" (another machine at Duke), and was described at the January Usenix conference.**
- **1986 breakthrough: Network News Transfer Protocol (NNTP) . News move via TCP/IP (internet).**

Specialprocessors: birth 1980, death ca 1990

- Symbolics founded 1980. **Created special hardware for running LISP programs (mostly AI) efficiently. The whole system written in LISP.**
- **21 founders: mostly from MIT AI lab.**
- **Revenue 35 millions by 1986, then decreases rapidly.**
- **Cost of a Symbolics machine in 1988 was between 36.000\$ and 125.000\$.**
- **Sun-X computer at that time started at 14.000\$**
- **Another Lisp machine company created at the same time: LMI LISP machine died even faster than Symbolics**



1980

January

- **Universal Data Systems announces the 103LP 300 bps modem, connecting directly into the phone line, requiring no additional power. Price: US\$195.**
- **Sinclair Research announces the ZX80 computer in the North American market. It uses a 3.25-MHz NEC Technologies 780-1 8-bit microprocessor, and comes with 1KB RAM and 4KB ROM.**

March

- **Microsoft Corp. announces its first hardware product, the Z-80 SoftCard for the Apple II. This card gives the Apple II CP/M capability, contributing greatly to Apple Computer's success. The card includes CP/M and Microsoft's Disk BASIC, all for US\$349.**
- **Satellite Software International ships WordPerfect 1.0 for Data General minicomputers.**

May

- **Apple Computer introduces the Apple III at the National Computer Conference, in Anaheim, California. The Apple III uses a 2-MHz 6502A microprocessor, and includes a 5.25-inch floppy drive. Price ranges from US\$4500 to US\$8000.**

1980

- **IBM's Corporate Management Committee gives William Lowe approval to begin Project Chess, by recruiting 12 engineers, and building a prototype microcomputer.**
- **IBM representatives meet with Microsoft's Bill Gates and Steve Ballmer to talk about Microsoft products, and home computers.**
- **IBM asks Bill Gates to write the operating system for their upcoming PC.**
- **IBM's Project Chess task force contacts Digital Research about using CP/M-86 for IBM's upcoming microcomputer. Gary Kildall is not interested, for a variety of reasons.**

August

- **IBM meets with Microsoft again, and shows plans for Project Chess, a personal computer. The code name for the computer is "Acorn". Bill Gates argues that IBM should use the 16-bit 8086, rather than the 8-bit 8080 processor.**
- **QDOS 0.10 (Quick and Dirty Operating System) is shipped by Seattle Computer Products. Even though it had been created in only two man-months, the DOS worked surprisingly well. A week later, the EDLIN line editor was created. EDLIN was supposed to last only six months, before being replaced.**

1980

- **Hal Lashlee and George Tate form Software Plus. The company later changes its name to Ashton-Tate.**
- **Microsoft announces the Microsoft XENIX OS, a portable and commercial version of the UNIX operating system for the Intel 8086, Zilog Z8000, Motorola M68000, and Digital Equipment PDP-11.**

September

- **Microsoft decides to propose to IBM that they provide the operating system for IBM's microcomputer.**
- **William Lowe assembles the members of "Project Chess", known as the "Dirty Dozen", the 12 engineers assembled to design and build the IBM PC, in Boca Raton, Florida.**
- **Apple Computer sells over 78,000 Apple II computers during the fiscal year.**
- **Software Publishing ships the pfs:File database program.**
- **IBM meets with Microsoft again, to formalize plans to work together in creating a new microcomputer.**

1980

October

- **Microsoft's Paul Allen contacts Seattle Computer Products' Tim Patterson, asking for the rights to sell SCP's DOS to an unnamed client (IBM). Microsoft pays less than US\$100,000 for the right.**
- **Bill Gates, Paul Allen, and Steve Ballmer meet with IBM in Boca Raton, Florida, to deliver a report to IBM. They propose that Microsoft be put in charge of the entire software development process for IBM's new microcomputer, including converting Seattle Computer Products' SCP-DOS to run on the computer.**

November

- **Microsoft and IBM sign a contract for Microsoft to develop certain software products for IBM's microcomputer.**

December

- **IBM delivers the first PC prototype to Microsoft, so they can begin developing BASIC and the machine's operating system.**
- **Apple Computer becomes a publicly held company, selling 4.6 million shares at US\$22 per share. More than 40 Apple employees and investors become instant millionaires.**

1980

- **Seattle Computer Products renames QDOS to 86-DOS, releasing it as version 0.3. Microsoft then bought non-exclusive rights to market 86-DOS.**
- **Logo Computer Systems is formed in Montreal, Canada, to market the public domain language LOGO.**
- **Microsoft begins work on its first microcomputer application, a spreadsheet program initially called Electronic Paper.**
- **Digital Research releases CP/M-86 for Intel 8086- and 8088-based systems.**
- **Intel announces the iAPX-432 32-bit microprocessor. Intel later builds the 80286 as a step between the 8086 and the 432.**
- **The term RISC (reduced instruction set computer) is coined by Professor David Patterson of the University of California in Berkeley. He designs a microprocessor called RISC I.**
- **Intel introduces the 8087 math coprocessor.**
- **Alan Ashton and Bruce Bastian found Satellite Software International.**
- **Apollo introduces a line of workstations using the Motorola 68000.**

1981-1982

- 1981-1982 Business Takes over
- Osborne, IBM, Compaq
- Lotus 1-2-3, MultiMate, Dbase II

MAIN HIGHLIGHTS

- IBM introduced its PC, **igniting a fast growth of the personal computer market**
- **The MS-DOS, or Microsoft Disk Operating System, the basic software for the newly released IBM PC, established a long partnership between IBM and Microsoft, which Bill Gates and Paul Allen had founded only six years earlier**
- **Apollo and Silicon Graphics: first workstation companies**

1981: big portable

- Adam Osborne **completed the first portable computer, the Osborne I, which weighed 24 pounds and cost \$1,795. Used Z80 (NOT IBM-PC clone (yet)!)**



1981: Apollo Computer

- Apollo Computer unveiled the first workstation, its **DN100**, offering more power than some minicomputers at a fraction of the price. Used a **Motorola 68000 microprocessor**.



1981: Silicon Graphics

- College professor James Clark founded Silicon Graphics, Incorporated. The 1000 and 1200 computers used a Motorola 68000 microprocessor with 8 Mhz and were sold as diskless systems intended for use as a terminal.



1981

January

- **Radio Shack ceases production of the TRS-80 Model I, and recalls units from the US market, due to failure to meet new FCC radio-frequency interference regulations.**
- **Commodore announces the VIC-20, with full-size 61-key plus four function key keyboard, 5KB RAM expandable to 32KB, 6502A CPU, 22 character by 23 line text display, and color graphics, for US\$299. During its life, production peaks at 9,000 units per day.**

February

- **Steve Wozniak's private plane crashes, leaving him with a temporary loss of short-term memory, lasting for over a month.**
- **MS-DOS runs for the first time on IBM's prototype microcomputer.**
- **Intel begins shipping evaluation sets of the iAPX432 microprocessor. Performance is claimed as 2 MIPS.**

1981

March

- **Sinclair unveils the ZX81 in the UK, based on the Z80A microprocessor, for under US\$200.**
- **Mike Markkula takes over as president and chief executive officer at Apple Computer. Steve Jobs remains as chairman of the board.**

April

- **Tim Patterson quits Seattle Computer Products, and joins Microsoft.**
- **Adam Osborne, of Osborne Computer Corporation, introduces the Osborne 1 Personal Business Computer at the West Coast Computer Faire. It features a Z80A CPU, 5-inch display, 64KB RAM, keyboard, keypad, modem, and two 5.25-inch 100KB disk drives for US\$1795. Weight: 24 pounds. It also includes US\$1500 worth of software, including CP/M, BASIC, WordStar, and SuperCalc. Osborne anticipated selling 10,000 in total, but sales quickly reached 10,000 in a single month.**
- **Mike Scott is forced out as Apple Computer president.**

1981

May

- **Xerox unveils the Star 8010, at the National Computer Conference. Many features that were developed on the Alto are incorporated. It includes a bitmapped screen, WYSIWYG word processor, mouse, laser printer, Smalltalk language, Ethernet, and software for combining text and graphics in the same document. At a starting price of US\$16-17,000, the computer is not a commercial success. During its lifetime, 100,000 units are produced.**
- **Atari announces the 8KB Atari 400 is being discontinued.**

June

- **Microsoft reorganizes into Microsoft Incorporated, with Bill Gates as President and Chairman, and Paul Allen as Executive Vice President.**
- **Microsoft persuades IBM to introduce its microcomputer with a minimum of 64KB RAM. IBM had planned to only include 16KB.**

1981

July

- **Xerox announces the Xerox 820. During its development, it was code-named The Worm. It uses the Z80 CPU, CP/M, and BASIC. The price with a dual disk drive and display is US\$3000.**
- **Microsoft buys all rights to DOS from Seattle Computer Products, and the name MS-DOS is adopted.**
- **IBM introduces its first desktop computer, the Datamaster. It uses a 16-bit 8086, and is a dedicated data processing machine.**

August

- **See next slide ...**

1981: IBM PC

- **IBM announces the IBM 5150 PC Personal Computer, in New York. The PC features a 4.77-MHz Intel 8088 CPU, 64KB RAM, 40KB ROM, one 5.25-inch floppy drive (160KB capacity), and PC-DOS 1.0 (Microsoft's MS-DOS), for about US\$3000. Also included is Microsoft BASIC, VisiCalc, UCSD Pascal, CP/M-86, and Easywriter 1.0. A fully loaded version with color graphics costs US\$6000.**
- **IBM announces the CGA graphics card for the PC, giving 640x200 resolution with 16 colors**



1981: Microsoft as a main IBM PC software provider

- The MS-DOS, or Microsoft Disk Operating System, the basic software for the newly released IBM PC, established a long partnership between IBM and Microsoft, which Bill Gates and Paul Allen had founded only six years earlier
- Microsoft buys all rights to DOS from Seattle Computer Products, and the name MS-DOS is adopted.



1981

September

- **Novell Data Systems hires SuperSet to create software to link computers together to share a hard drive.**
- **Microsoft begins work on a graphical user interface for MS-DOS, initially called Interface Manager, because it would effectively hide the interface between programs and devices like printers and video cards.**
- **Apple Computer introduces its first hard drive, the 5MB ProFile, for US\$3499.**
- **IBM begins shipping the IBM PC, ahead of schedule, something unheard of in the microcomputer industry.**

October

- **A senior scientist at Bell Telephone Laboratories declares that video monitors pose no health hazard due to radiation exposure.**

1981

November

- Novell Data Systems ships the Novell Data Management Computer, **with the ability to share its hard drive space with other computers through software control and network cards.**
- Ashton-Tate ships dBase II, **the early industry-standard database program.**

December

- Intel ships the 8087 math coprocessor. **[446.504]**
- **Sinclair Research reports that it has shipped 250,000 ZX81 personal computers.**
- National Semiconductor announces the 32000 chip, the first commercial 32-bit microprocessor. **The 32000 family includes CPUs and peripheral chips.**

month unknown

- **David Bunnell starts PC Magazine, in San Francisco.**
- **Hayes Microcomputer Products advertises the Smartmodem 300, which becomes the industry standard.**

1981: Apple marketing ideas, logos etc

- Apple Computer signs a secret agreement with Apple Corps Limited (the record company started by the Beatles), allowing Apple Computer to use the "Apple" name for its business. Apple Computer agrees not to market audio/video products with recording or playback capabilities.



MAIN HIGHLIGHTS

- Sun Microsystems founded: **most influential workstation company so far**
- Mitch Kapor developed Lotus 1-2-3, **writing the software directly into the video system of the IBM PC.**
- **The use of computer-generated graphics in movies took a step forward with Disney's release of "Tron".**

1982: SUN Microsystems

- Sun Microsystems is founded. "SUN" originally stood for Stanford University Network. Motto "Network is the computer".
- Four employees. Khosla, McNealy, Joy, Bechtolsheim.
- First workstation introduced. It includes TCP/IP, now known as the Internet protocol suite (NOT invented by Sun)



- The SUN-2 features a Motorola 68010 processor and uses a Multibus. This one has 4MB of memory installed and a 400MB Fujitsu M2351 Eagle disk.
- The SUN-2 can be used diskless when booted from a server. In 1982 the Network File System (NFS) was a new invention by Sun.

1982

- **The US Justice Department** throws out the antitrust lawsuit **filed against IBM 13 years ago.**
- Microsoft signs an agreement with Apple Computer, **for Microsoft to develop applications for the Macintosh.**
- **IBM splits its Personal Computer development team into three groups: one to work on the PC XT, one to develop the PCjr, and one to start work on the PC AT.**
- **Compaq Computer Corporation is founded by Rod Canion, Jim Harris, and Bill Murto, all former senior managers of Texas Instruments.**
- **Intel introduces the 6-MHz 80286 microprocessor. It uses a 16-bit data bus, 134,000 transistors (1.5 microns), and offers protected mode operation. Initial price is US\$360 each, in quantities of 100. It can access 16 MB of memory, or 1 GB of virtual memory. Speed is 0.9 MIPS. Later versions operate at 8-MHz, 10-MHz (1.5 MIPS), and 12-MHz (2.66 MIPS).**

1982

January

- **Kazuhiko Nishi, Microsoft's representative in Japan, shows Bill Gates a drawing of a prototype for a portable computer, using a new liquid crystal display developed by Hitachi. Gates and Nishi begin designing the details of the computer, which Kyocera Corporation in Japan had agreed to manufacture.**
- **In the first 10 months of sale, 250,000 Sinclair ZX81 microcomputers have been delivered.**
- **Microsoft signs an agreement with Apple Computer, for Microsoft to develop applications for the Macintosh.**
- **Apple Computer gives Microsoft its first Macintosh prototype, for Microsoft to develop applications on.**

1982

February

- **The first issue of PC Magazine is released.**
- **IBM splits its Personal Computer development team into three groups: one to work on the PC XT, one to develop the PCjr, and one to start work on the PC AT.**
- **Compaq Computer Corporation is founded by Rod Canion, Jim Harris, and Bill Murto, all former senior managers of Texas Instruments.**
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- **Sun Microsystems is founded. "SUN" originally stood for Stanford University Network.**

1982

March

- **Microsoft releases FORTRAN for MS-DOS. [346.262]**

April

- **Mitch Kapor founds Lotus Development Corporation.**
- **Eight months after the introduction of the IBM PC, 50,000 units have been sold.**

May

- **Sun Microsystems begins shipping the Sun 1 workstation computer.**
- **Microsoft releases MS-DOS 1.1 to IBM, for the IBM PC. It supports 320KB double-sided floppy disk drives. Microsoft also releases MS-DOS 1.25, similar to 1.1 but for IBM-compatible computers.**

June

- **The first IBM PC clone, the MPC, is released by Columbia Data Products.**

July

- **Apple Computer releases the Apple Dot Matrix Printer, for US\$700. It is a modified C.Itoh printer.**
- **Context MBA is the first integrated software package, with spreadsheet, graphics, word processing, data management, and communications.**

1982

- August
- **IBM ships the 200,000th IBM PC.**
- **Microsoft releases Multiplan for the Apple II and the Osborne I.**
- **Hercules announces the Hercules Graphics Card (HGC or HGA), with monochrome graphics at 720x348 resolution.**

September

October

November

- **Lotus Development announces the Lotus 1-2-3 spreadsheet program at Comdex in Las Vegas.**
- **Corporate headhunter Gerry Rocke, of Heidrick & Struggles, calls Pepsi-Cola president John Sculley, asking him to take the position of chief executive of Apple Computer.**
- **Compaq Computer introduces the Compaq Portable PC: 4.77MHz 8088, 128KB RAM, 9-inch monochrome monitor, one 320KB 5.25-inch disk drive, price US\$3000. It cost Compaq US\$1 million to create an IBM-compatible ROM BIOS that did not violate IBM's copyright.**

1982

- December
- **Satellite Software International ships WordPerfect 2.0 for DOS, for US\$500.**
- **Digital Research announces CP/M+.**
- **Atari issues a US\$55 rebate on the Atari 400, dropping its retail price to under US\$200.**
- **Sales of all Apple II systems to date: 750,000.**
- **Apple Computer becomes the first personal computer company to reach US\$1 billion in annual sales.**

month unknown

- **Microsoft releases GW-BASIC, with advanced graphics capabilities. [346.262]**
- **Microsoft releases Microsoft COBOL for MS-DOS.**
- **IBM releases Digital Research's CP/M-86 for the IBM PC.**
- **Symantec is formed.**

1983 main highlights

- **Apple introduced its Lisa. The first personal computer with a graphical user interface, its development was central in the move to such systems for personal computers.**
- **Compaq Computer Corp. introduced first PC clone that used the same software as the IBM PC.**
- **Oracle got its name (renamed from “Relational Software”)**
- **Unix system V version, C++ language, Turbo Pascal, MS Word**
- **The Musical Instrument Digital Interface was introduced at the first North American Music Manufacturers show in Los Angeles.**

1983: LISA

- Apple Computer officially unveils the Lisa computer. **It features a 5-MHz 68000 microprocessor, 1MB RAM, 2MB ROM, a 12-inch B/W monitor, 720x364 graphics, dual 5.25-inch 860KB floppy drives, and a 5MB Profile hard drive. It is slow, but innovative. Its initial price is US\$10,000. The Lisa cost Apple Computer US\$50 million to develop. It is the first personal computer with a graphical user interface (GUI). The software for it cost Apple Computer US\$100 million to develop. "Lisa" stands for Local Integrated Software Architecture. During its lifetime, 100,000 units are produced.**
- Quote by Steve Jobs, of Apple Computer, "We're prepared to live with Lisa for the next ten years."

1983: Oracle corporation: SQL databases etc

- **1974-1979:** IBM System/R project gives SQL language for database manipulation and queries. SQL invented by IBM. Ideas: 70-72 Codd.
- **1977 Relational Software Inc. (RSI - currently Oracle Corporation) established:** Ellison and Miner.
- **1978 Oracle V1** ran on PDP-11 under RSX, 128 KB max memory. Written in assembly language. Implementation separated Oracle code and user code. Oracle V1 was never officially released.
- **1980 Oracle V2** released on DEC PDP-11 machine. Still written in PDP-11 assembly language, but now ran under Vax/VMS.
- **1982 Oracle V3** released, Oracle became the first DBMS to run on mainframes, minicomputers, and PC's. Code was written in C.
- **1983 Relational Software Inc.** changed its name to Oracle Corporation.



1983: other important software

Big machines:

- **AT&T announces UNIX System V.**
- **AT&T Bell Labs designs C++.**

Small machines:

- **Lotus Development ships Lotus 1-2-3 Release 1.0 for MS-DOS. Functions: spreadsheet+database+graphics. US\$1 million was spent on promoting the release. It requires 256KB of RAM, more than any microcomputer program at the time. Jonathan Sachs was the programmer, with Mitch Kapor as the software designer.**
- **Borland International is founded by Philippe Kahn. Borland International releases Turbo Pascal for CP/M and 8086-based computers.**

1983

- **AT&T announces UNIX System V.**
- **Apple Computer introduces the Apple IIe. It features 64KB RAM, Applesoft BASIC, upper/lower case keyboard, seven expansion slots, 40x24 and 80x24 text, 1-MHz 6502 processor, up to 560x192 graphics, 140KB 5.25-inch floppy drive, Apple DOS 3.3, for US\$1400.**
- **Lotus Development ships Lotus 1-2-3 Release 1.0 for MS-DOS. US\$1 million was spent on promoting the release. It requires 256KB of RAM, more than any microcomputer program at the time. Jonathan Sachs was the programmer, with Mitch Kapor as the software designer.**
- **IBM announces the IBM PC XT. It adds a 10 MB hard drive, three more expansion slots, and a serial interface. With 128KB RAM and a 360KB floppy drive, it costs US\$5000.**
- **Microsoft announces MS-DOS 2.0 for PCs. It was written from scratch, supporting 10 MB hard drives, a tree-structured file system, and 360 KB floppy disks.**

1983

- Microsoft introduces XENIX 3.0.
- Microsoft introduces Multi-Tool Word for DOS (later renamed Microsoft Word) word processing program at Spring Comdex in Atlanta, Georgia.
- John Sculley is hired at Apple Computer as Chief Operating Officer.
- Microsoft gives a "smoke-and-mirrors" demonstration of Interface Manager (later called Windows), which consists entirely of overlapping windows, appearing to be running programs simultaneously.
- At the NCC, Jerry Pournelle (popular writer in Byte magazine) gives his predictions about computer technology in the year 1988: RAM would be 30 cents/KB, all microcomputers would have at least 1MB RAM, 10 MB hard drives would be common, operating systems would be in ROM chips, hard drive space would cost under 5 cents/KB, letter quality printers would cost US\$1000-1500, combination laser printer/ copy machines would be US\$2000, full business-quality computers would cost \$1000, and all televisions would include computers.

1983

- The one millionth Apple II is made.
- Microsoft, SpectraVideo, and 14 Japanese computer companies announce the MSX specifications for low-end, 8-bit home computers systems. The standard is Zilog Z80, TI TMS9918A video processor, General Instruments AY-8910 sound processor, NEC cassette interface chip, Atari joystick interface, 64 KB RAM, Microsoft's 32 KB ROM-based extended BASIC.
- AT&T Bell Labs designs C++.
- Steve Wozniak returns to Apple Computer.



1983

- **Microsoft formally announces Microsoft Windows, at the Plaza Hotel in New York. It is promised for release in April, 1984.**
- **Borland International releases Turbo Pascal for CP/M and 8086-based computers.**
- **IBM announces the IBM PCjr, using Intel's 8088, for US\$700 for the bare configuration. Code name during development was Peanut.**
- **Quote from Spinnaker Software chairman William Bowman: "We're just sitting here trying to put our PCjrs in a pile and burn them. And the damn things won't burn. That's the only thing IBM did right with it - they made it flameproof."**

1983

- Microsoft officially releases Microsoft Word 1.0, for US\$375, or US\$475 with the Microsoft Mouse.
- Apple Computer introduces the redesigned Apple III as the Apple III+, for US\$3000.
- Apple unveils the new Macintosh to the press.
- Microsoft marketer Rowland Hanson convinces Bill Gates to change the name of Interface Manager to Windows.
- IBM and Microsoft begin co-developing OS/2. [38]
- Dan Silva and others leave Xerox, to form Electronic Arts.
- Franklin shows an operating Franklin Ace 1200 Apple II compatible at the CP/M '83 Show. It features an 8-bit processor, 128KB RAM, color display, upper/lower-case keyboard, 143KB floppy drive, CP/M card, 80-column text card, for US\$2200.
- In its first year, Compaq Computer sells 47,000 computers, worth US\$111 million.
- George Tate, of Ashton-Tate, buys all rights to dBase II from Wayne Ratcliff, and hires him as head of development for dBase III.

1983

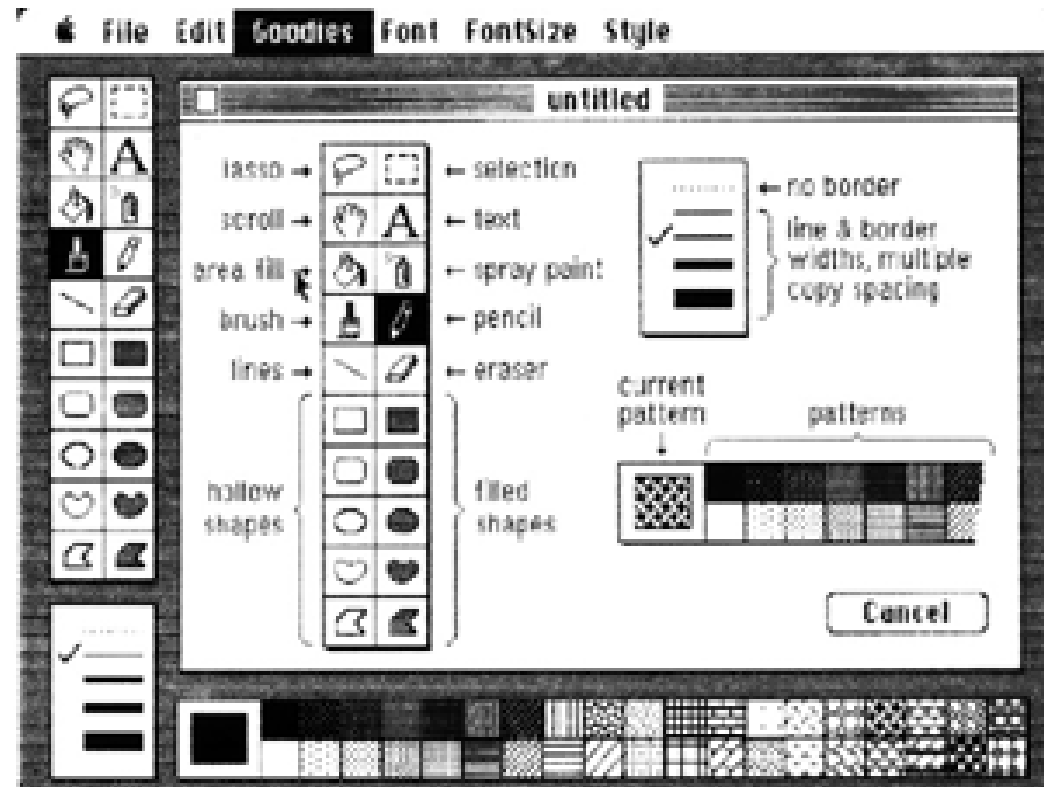
- **Borland International is founded by Philippe Kahn.**
- **Microsoft shows IBM a raw version of Windows. IBM is not interested as they are already developing what would be called TopView.**
- **Novell introduces the NetWare network operating system for the IBM PC.**
- **Bjorne Stroustrup creates the C++ extension to the C programming language.**

1984 main highlights

- Apple Computer launched the Macintosh, **the first successful mouse-driven computer with a graphic user interface, with a single \$1.5 million commercial during the 1984 Super Bowl.**
- The 3 1/2-inch "microfloppy" diskette **won widespread acceptance, aided by Apple Computer's decision to integrate its use into the new Macintosh.**
- IBM released its PC Jr. and PC-AT. **The PC Jr. failed, but the PC-AT, several times faster than original PC and based on the Intel 80286 chip, claimed success with its notable increases in performance and storage capacity, all for about \$4,000.**
- In his novel "Neuromancer," William Gibson coined the term "cyberspace." **He also spawned a genre of fiction known as "cyberpunk" in his book, which described a dark, complex future filled with intelligent machines, computer viruses, and paranoia.**
- GNU project launched
- X-Window **system started in MIT**

1984: Apple Macintosh

- Apple Computer's Steve Jobs introduces the Apple Macintosh at the Flint Center of DeAnza College in Cupertino, California. The Macintosh uses the 8-MHz 32-bit Motorola 68000 CPU, built-in 9-inch B/W screen, 512x342 graphics, 400KB 3.5-inch floppy disk drive, mouse, 128KB RAM, and weighs 20 pounds. Price: US\$2500.



1984: Apple Macintosh

- Apple Computer launched the Macintosh, the first successful mouse-driven computer with a graphic user interface, with a single \$1.5 million commercial during the 1984 Super Bowl.
- ” On January 24th, Apple Computer will introduce Macintosh. And you will see why 1984 won't be like "1984."

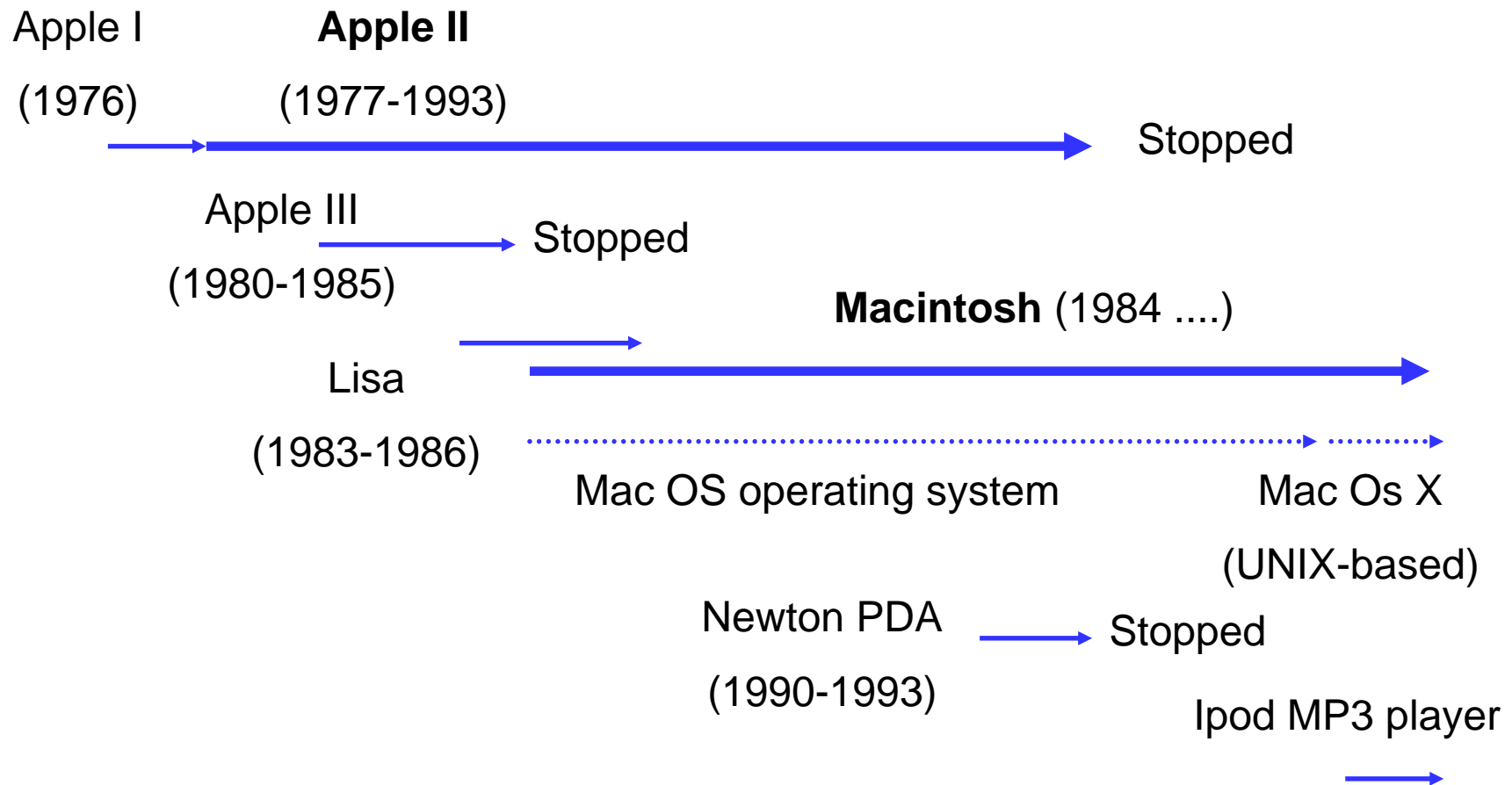


1984

- IBM ships the IBM PCjr. It uses the 8088 CPU, includes 64KB RAM, a "Freeboard" keyboard, and one 5.25-inch disk drive, no monitor, for US\$1300.
- 74 days after the introduction of the Macintosh, 50,000 units have been sold. [218]
- Apple Computer unveils the Apple IIc with an intense publicity extravaganza, at the Moscone Center in San Francisco. Priced at US\$1300, 2,000 dealers place orders for more than 52,000 units on the day of its introduction. The IIc uses a 65C02A microprocessor, 128KB RAM, weighs 7.5 pounds, includes a 3.5-inch floppy drive, supports 40- or 80-column screens, and allows both QWERTY and Dvorak keyboard layouts.
- Apple Computer retires the Apple III and Apple III+, with only 65,000 units sold in total.

Apple product lines: overview

- **Two main lines:** Apple II and Macintosh
- **Develop BOTH hardware and software (operating system and other important modules used by all external programmers)**



1984

- Microsoft's Bill Gates and Steve Ballmer write an internal applications strategy memo on the company's commitment to the GUI, on the Macintosh and for Windows.
- Ashton-Tate ships dBase III.
- Six months after its introduction, 100,000 Macintosh computers have been sold.
- IBM announces the PC AT, a 6MHz 80286 computer using PC-DOS 3.0, a 5.25-inch 1.2MB floppy drive, with 256KB or 512KB RAM, optional 20 MB hard drive, monochrome or color monitor. Price ranges from US\$4000-6700, depending on configuration.
- IBM introduces PC/IX, based on UNIX System III from AT&T, for the PC AT.
- IBM announces TopView, a DOS multitasking program.
- IBM announces the Enhanced Graphics Adapter (EGA), supporting up to 640x350 resolution in 16 colors. With 64K, the card costs US\$524. For 640x350x16 mode, a US\$200 64KB RAM expander is required.
- Apple Computer introduces the Macintosh 512K for US\$3200. It uses an 8-MHz 68000 processor, and comes with 512 KB RAM, and a 400 KB 3.5-inch floppy drive.

1984

- **Microsoft gives a demonstration of the final version of Windows to IBM. For the third time, IBM is not interested.**
- The number of hosts on the Internet reaches 1000.
- **Lotus Development officially announces Jazz for the Macintosh, an all-in-one program incorporating a spreadsheet, database, graphics, word processing, and communications.**
- **The 2 millionth Apple II computer is sold.**
- Sierra On-Line releases the game King's Quest.
- Apple Computer releases AppleWorks, **one of the first integrated software packages, with modules for word processing, database management, and spreadsheet calculations. It was written by Rupert Lissner.**
- **Hewlett-Packard introduces the LaserJet laser printer, featuring 300dpi resolution, for US\$3,600.**
- **Foxbase releases Foxbase for MS-DOS.**
- **MIPS Computer Systems is founded (a spinoff from SGI), and begins developing its RISC architecture.**

1984

- **Sun Microsystems co-founder Vinod Khosla resigns.**
- Scott McNealy is appointed president of Sun Microsystems.
- **subLogic releases Flight Simulator for the Commodore 64.**

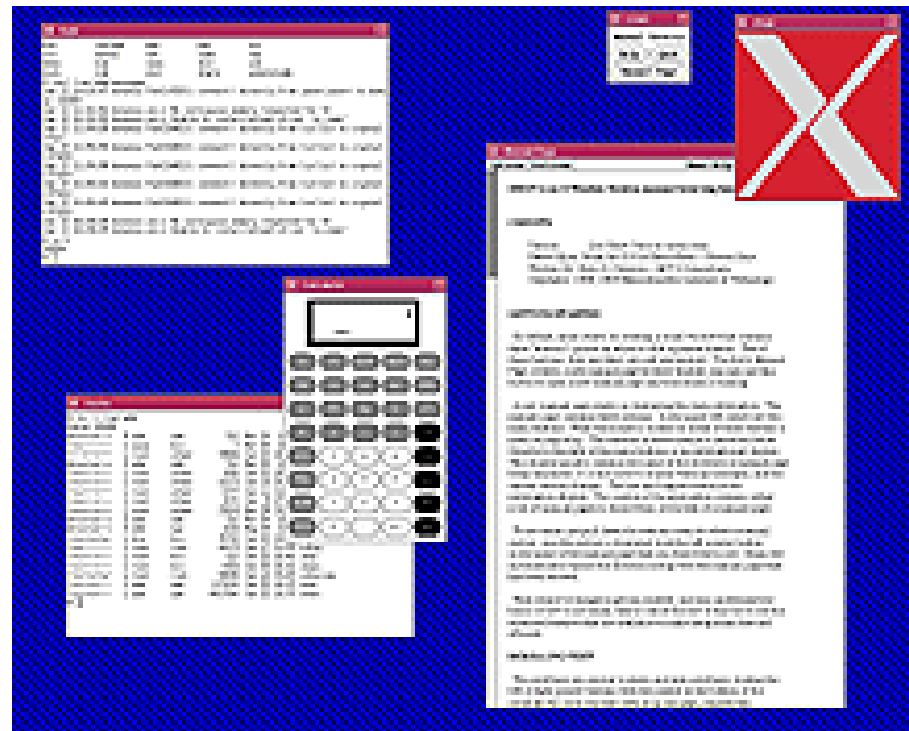
1984

- Richard Stallman launches the GNU Project, to develop the free operating system GNU (anacronym for ``GNU's Not Unix''), and thereby give computer users the freedom that most of them have lost. GNU is free software: everyone is free to copy it and redistribute it, as well as to make changes either large or small.



1984

- The Massachusetts Institute of Technology (MIT) begins developing the X Window System. X is the basic window system for almost all UNIX machines nowadays.



1985: Main highlights

- The modern Internet gained support **when the National Science foundation formed the NSFNET, linking five supercomputer centers at Princeton University, Pittsburgh, University of California at San Diego, University of Illinois at Urbana-Champaign, and Cornell University.**
- **Able to hold 550 megabytes of prerecorded data, the new CD-ROMs grew out of regular CDs on which music is recorded.**
- **The C++ programming language emerged as the dominant object-oriented language in the computer industry when Bjarne Stroustrup published "The C++ Programming Language."**
- **Free GNU Emacs 15.34 released by Richard Stallman**

1985

- **IBM announces that it will cease production and promotion of the IBM PCjr.**
- **The Macintosh XL (formerly called Lisa) is dropped from Apple Computer's product line.**
- **Apple Computer's board of directors approves John Sculley's decision to remove Steve Jobs as head of the Macintosh division.**
- **Apple Computer president John Sculley essentially fires Steve Jobs at Apple Computer.**
- **Microsoft introduces Microsoft Excel for the Macintosh, in New York.**
- **Lotus Development releases Lotus Jazz for the Macintosh, for US\$595.**
- **Microsoft demonstrates Microsoft Windows at Spring Comdex. Release date is set for June, at a price of US\$95.**
- **Apple Computer reports its first quarterly loss.**

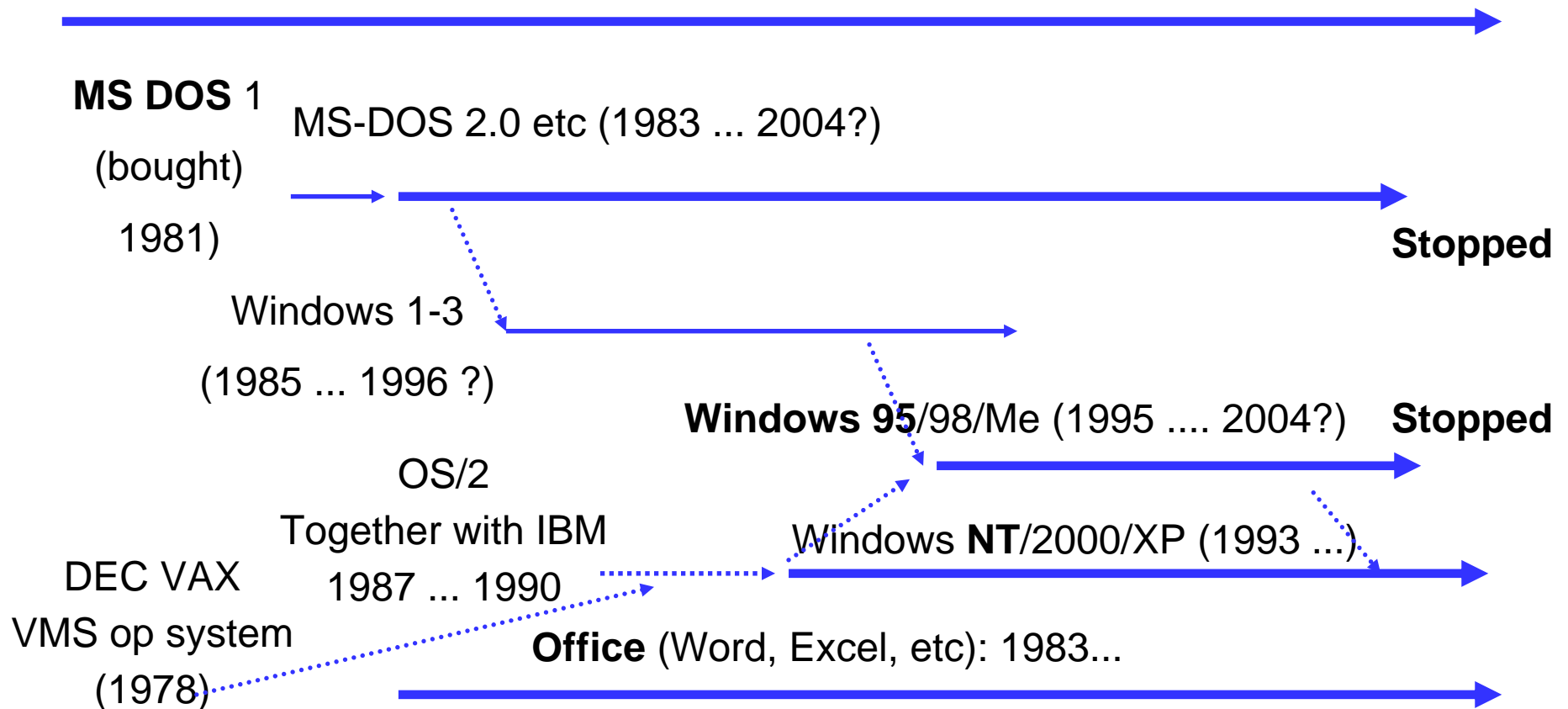
1985

- Microsoft and IBM sign a joint-development agreement **to work together on future operating systems and environments.**
- **Apple Computer co-founder Steve Jobs resigns from Apple Computer.**
 - **Steve Jobs and five senior managers of Apple Computer Inc. found NeXT Incorporated.**
 - **Microsoft ships Microsoft Windows 1.0, for US\$100. It is delivered two years after the initial announcement of the product**
 - **Broderbund releases Karateka for the Commodore 64.**
 - **Steve Jobs sells 4 million shares of Apple Computer, netting about US\$70.5 million. If he had held them to the fall of 1987, they would have brought US\$481 million.**
 - **U.S. Robotics introduces the Courier 2400 modem.**
 - **Intel introduces the 80287 math coprocessor.**
 - **Microsoft purchases all rights to DOS from Seattle Computer Products for US\$925,000.**
 - **Sun Microsystems begins work on its SPARC processor.**
- **Microsoft releases QuickBASIC 1.0.**

Microsoft main product lines: overview

- **Main lines:** progr languages, MS-DOS, Windows, NT/2000/XT, Office
- **Develop software (hardware: mouse, Xbox, etc are much less important) for IBM PC clones and (Office, Basic) for Apple**

Basic, (Fortran), (Cobol), **C**, C++, C# etc interpreters and compilers: 1975 ...



1986

- **David Miller of AT/T Bell Labs patented the optical transistor, a component central to digital optical computing.**
- **Daniel Hillis of Thinking Machines Corp. moved artificial intelligence a step forward when he developed the controversial concept of massive parallelism in the Connection Machine.**
- **IBM and MIPS released the first RISC-processor-based workstations, the PC/RT and R2000-based systems.**
- **Compaq beat IBM to the market when it announced the Deskpro 386, the first computer on the market to use Intel's new 80386 chip, a 32-bit microprocessor with 275,000 transistors on each chip.**

1987

- **Motorola unveiled the 68030 microprocessor.**
- **Sun unveiled the Sparc microprocessor, based on RISC ideas.**
- **IBM introduced its PS/2 machines, which made the 3 1/2-inch floppy disk drive and video graphics array (VGA) standard for IBM computers.**
- **Apple engineer William Atkinson designed HyperCard, a software tool that simplifies development of in-house applications. HyperCard was one of the inspirations for the web browser, which came in 1990.**

Side note: **CISC vs RISC processor architectures**

- **CISC: complex instruction set computer (Intel, motorola 68000 series, ..)**
 - A large number of instructions, most are relatively slow
- **RISC: reduced instruction set computer (PowerPC, Sparc,)**
 - A small number of instructions, all are very fast
- **In practice, CISC and RISC ideas converge in newer processors**

1987: GCC, the main C compiler nowadays

- GCC version 1.0 released by [Free Software Foundation](#) founder [Richard Stallman](#).
- GCC once stood for GNU C Compiler, since it was used to compile programs written in the C programming language for Stallman's "[GNU's Not Unix](#)" (GNU) effort to create a clone of Unix. Now, though, because GCC accepts programs written in many other languages as well, GCC stands for GNU Compiler Collection.
- GCC is the main compiler used on all kinds of UNIX-es, and several ports of GCC (cygwin, djgpp) are highly popular on MS Windows as well
- Ported to a very large number of processors
- Compiles: C, C++, Objective C, Fortran, Java, Ada, (Pascal)

1988

- **Apple cofounder Steve Jobs, who left Apple to form his own company, unveiled the NeXT workstation.**
- **Compaq and other PC-clone makers developed enhanced industry standard architecture -- better than microchannel and retained compatibility with existing machine (ISA).**
- **Pixar's "Tin Toy" became the first computer-animated film to win an Academy Award, taking the Oscar for best animated short film. Pixar was founded by Jobs.**
- **Robert Morris' worm flooded the ARPANET. Then-23-year-old Morris, the son of a computer security expert for the National Security Agency, sent a nondestructive worm through the Internet, causing problems for about 6,000 of the 60,000 hosts linked to the network.**

1989

- Intel released the 80486 microprocessor and the i860 RISC/coprocessor chip, each of which contained more than 1 million transistors.
- Motorola announced the 68040 microprocessor, with about 1.2 million transistors.
- Maxis released SimCity, a sophisticated video game that helped launch a new genre, the simulation.
- AOL (America Online) network service launched for Macintosh and Apple II (MS Windows version appears in 1993). The company - Quantum Computer Services – was created in 1985, by Steve Case, initially running internet services (games, email, chat, news) for the Commodore 64 machines using dial-up.
AOL provided access to the Internet, and, in addition, offered access to its own online information and services tailored to average Americans.
NB! In the initial years of AOL there was no WWW or HTML.